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Experiments on the Rayleigh-Taylor instability of gas-gas interfaces accelerated by an expansion wave ROBERT MORGAN, OLEG LIKHACHEV, JEFFREY JACOBS, The University of Arizona — Experiments are presented in which a diffuse interface between two gases is accelerated to generate the Rayleigh-Taylor instability. The initially flat interface is generated by the opposing flow of two gases at matched volumetric flow rates. The interface is accelerated by an expansion wave generated by the rupturing of a diaphragm separating the heavy gas from a vacuum tank evacuated to approximately 0.1atm. The expansion wave generates a very high, O(1e3g0), but non-constant acceleration on the interface causing the Rayleigh-Taylor instability to develop. Shadowgraphy is employed to visualize the instability using two sets of three 200 mm diameter f/6.0 parabolic mirrors and three CMOS cameras operating at 10kHz with exposure times of 1e-6s. Planar Mie scattering is also employed using a planar laser sheet generated at the top of the apparatus which illuminates smoke particles seeded in the heavy gas. The scattered light is then imaged using three CMOS cameras operating at 10kHz. Experiments are shown in which a random perturbation is introduced by vertically oscillating the fluid interface to produce Faraday waves.

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